



# **Ethanol in California Security of Supply**

Platts

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CALIFORNIA ENERGY COMMISSION



## Presentation Topics

- Background
- California context
- Ethanol production – U.S. & California
- Projected growth of ethanol supply & demand
- Potential sources of incremental ethanol supplies
- Viability of California ethanol production
- California ethanol logistics
- Potential logistical issues associated with expanded use
- Security of ethanol & gasoline supplies



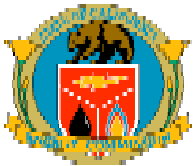
## Background

- The state of California determined that continued use of MTBE represented an increased risk to groundwater supplies
- Governor Davis executive order phased out use of MTBE
- The California Air Resources Board promulgated amendments to existing reformulated gasoline regulations
- Transition from MTBE to ethanol in California began in January 2003 – more than half of the refiners converted
- Rest of the industry followed January 2004

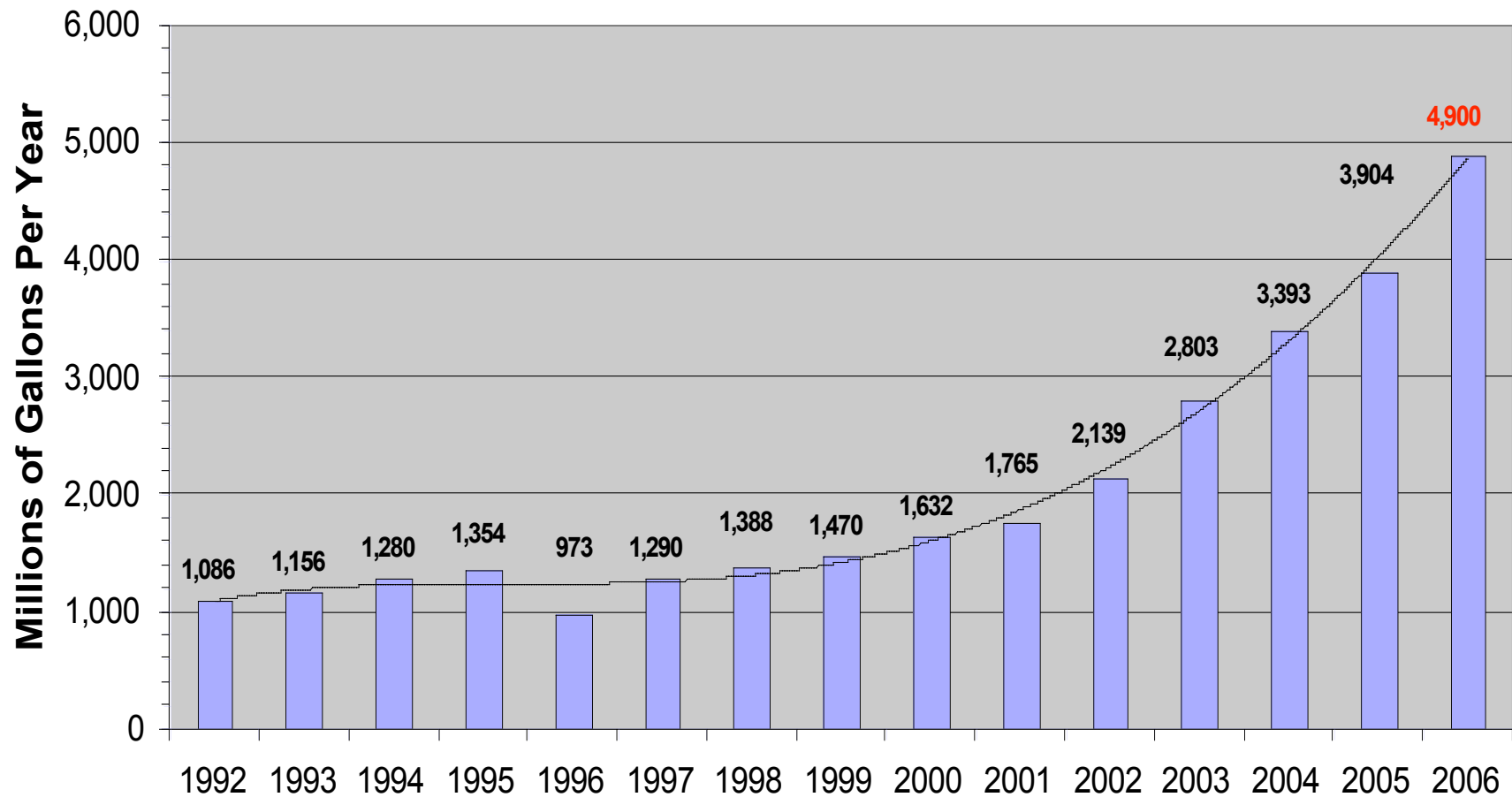


## California Context

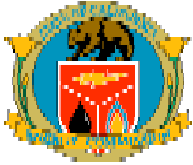
- California is the largest consumer of ethanol in the nation, in 2005 over 950 million gallons or 62 thousand barrels per day – 24% share of U.S. demand
- Imports via rail from the Midwest account for the majority of the state's supply
- Foreign imports and local production increasing
  - 9% in 2005 & 14% in 2006
- Adequacy of ethanol supply critical transportation fuel issue
- Relative importance of ethanol likely to grow due to goals calling for an increased use renewable fuels and decreased global climate change emissions



## U.S. Ethanol Production 1992 - 2005 with 2006 Projection



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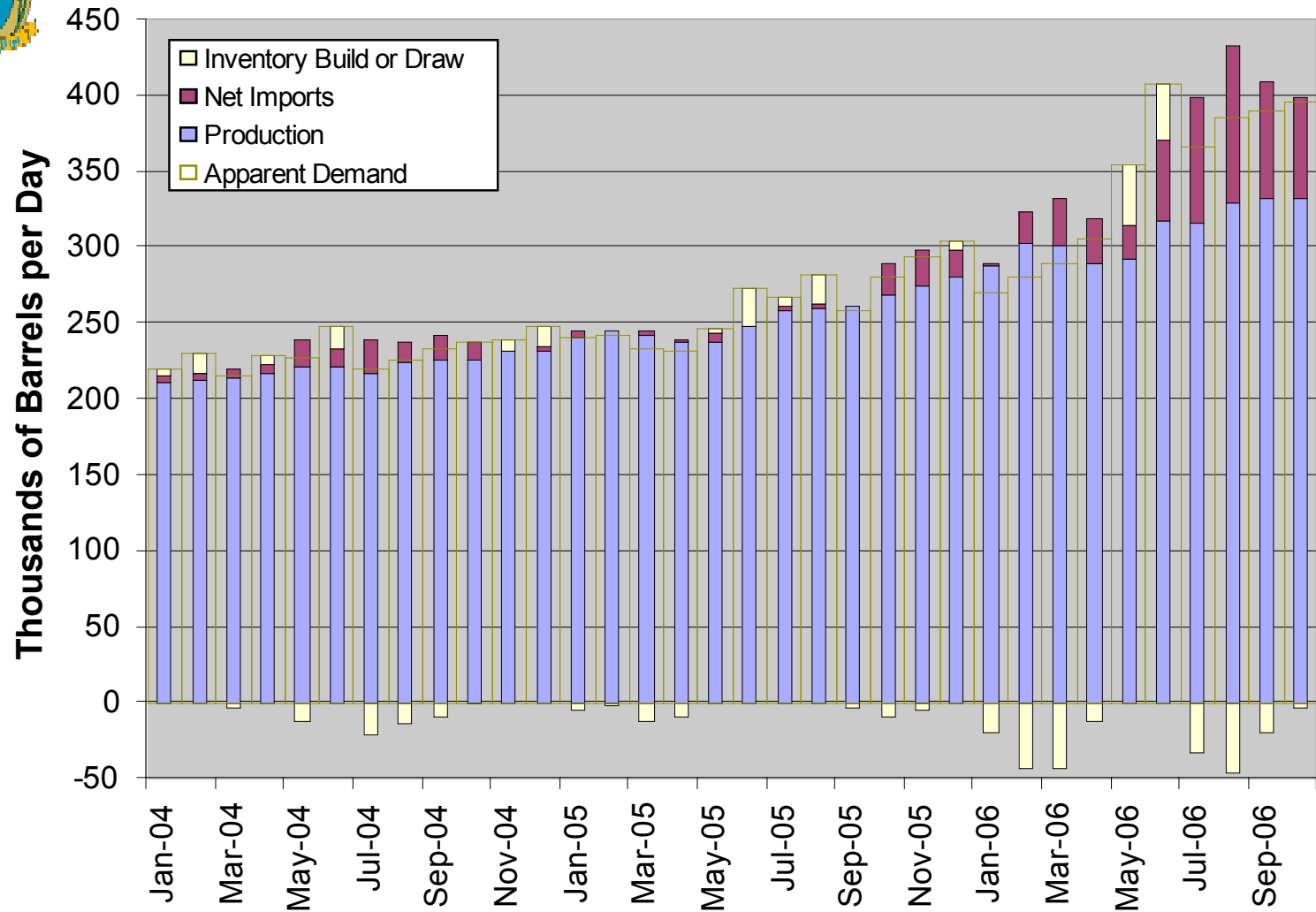


## U.S. Ethanol Production

- Domestic ethanol production has increased dramatically over the last couple of years
- Recent ethanol capacity expansion has been spurred on by the Renewable Fuels Standard (RFS) that was part of the 2005 Energy Policy Act
- U.S. production is estimated at 4.9 billion gallons for 2006
- Record production levels important source of incremental supply to meet the increased ethanol demand necessitated by the voluntary phaseout of MTBE during 2006



## U.S. Ethanol Supply & Demand



Source of Data: Energy Information Administration

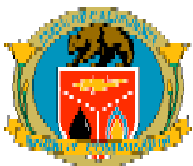
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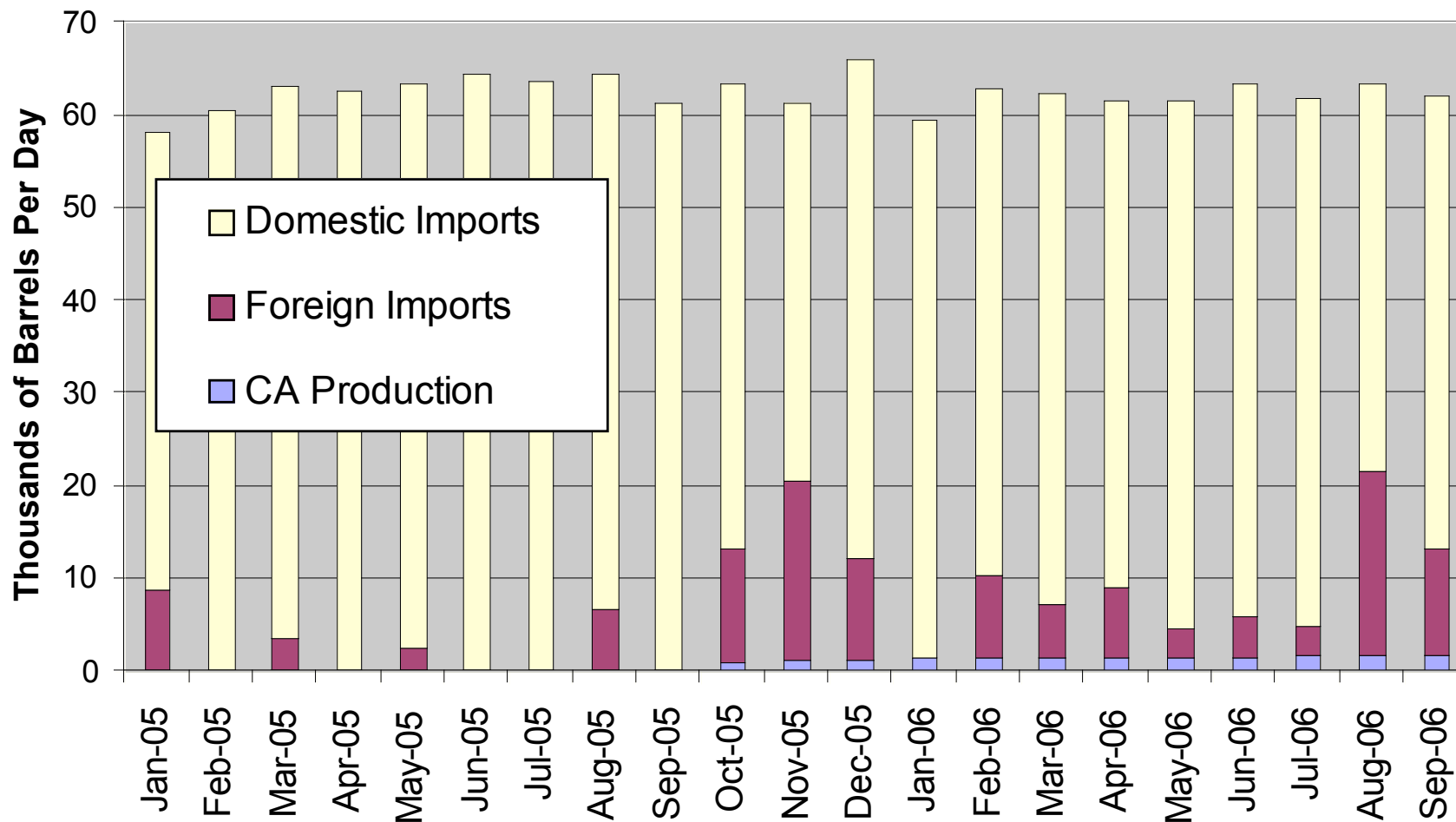
## U.S. Ethanol Supply & Demand

- US ethanol demand in 2005 was 4.0 billion gallons or about 263 thousand barrels per day
- 2006 demand estimated at nearly 5 billion gallons or 326 thousand barrels per day
- Daily average demand peaked in June 2006
  - 408 thousand barrels per day
  - 34% higher than 2005 peak during December
- Imports historically augment supply periodically
  - But 2006 net import volumes have eclipsed all combined imports for the previous 12 years





## CA Ethanol Demand & Sources January 2005 through September 2006



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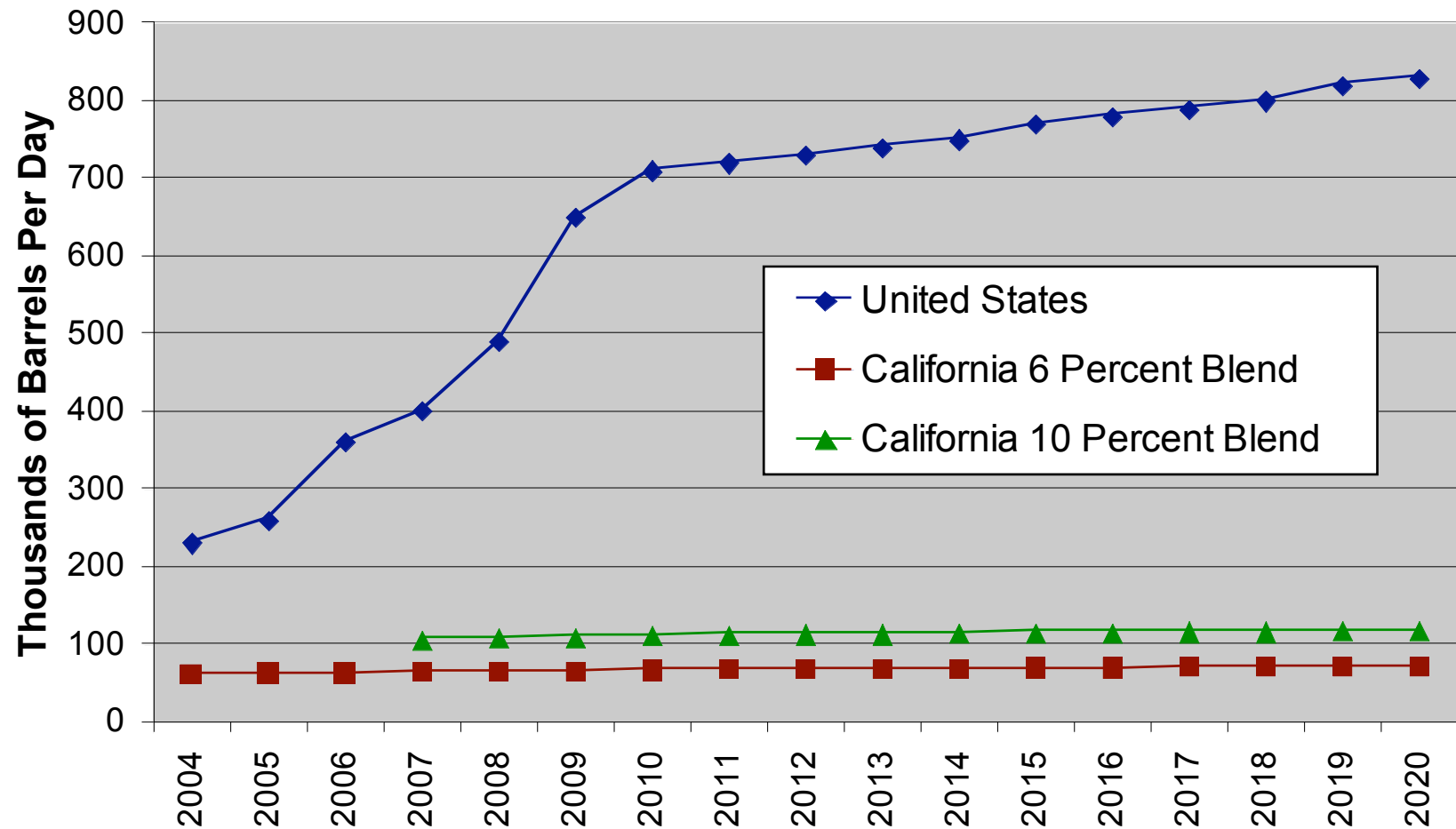


## California Ethanol Demand – Current Status

- California's 2005 ethanol demand was 950 million gallons or about 62 thousand barrels per day, roughly 24% of total U.S. demand
- 2006 demand is estimated to be slightly less due to a decrease in gasoline demand compared to 2005
- California's share of U.S. ethanol demand declined to 19% due to increased use outside the state
- Ethanol is blended in virtually all of the state's gasoline at an average concentration of 6% by volume
- The majority of the ethanol used in California comes from facilities primarily located in U.S. Midwestern states



## Ethanol Demand Forecast U.S. & California 2004 - 2020



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## California Ethanol Demand - Forecast

- Assuming gasoline demand growth resumes at the forecasted rate of 0.9% per year, California's ethanol demand could reach between 1.1 billion gallons by 2020
- Ethanol demand by 2020 could be 1.8 billion gallons if the market shifts to 10% blends
- Expanded use of E85 and potential use of ethanol in diesel fuel could push California demand over 2 billion gallons over the next 13 years
- Such ethanol demand increases would mean California ethanol consumption could double – but what would be the potential sources of this incremental supply?

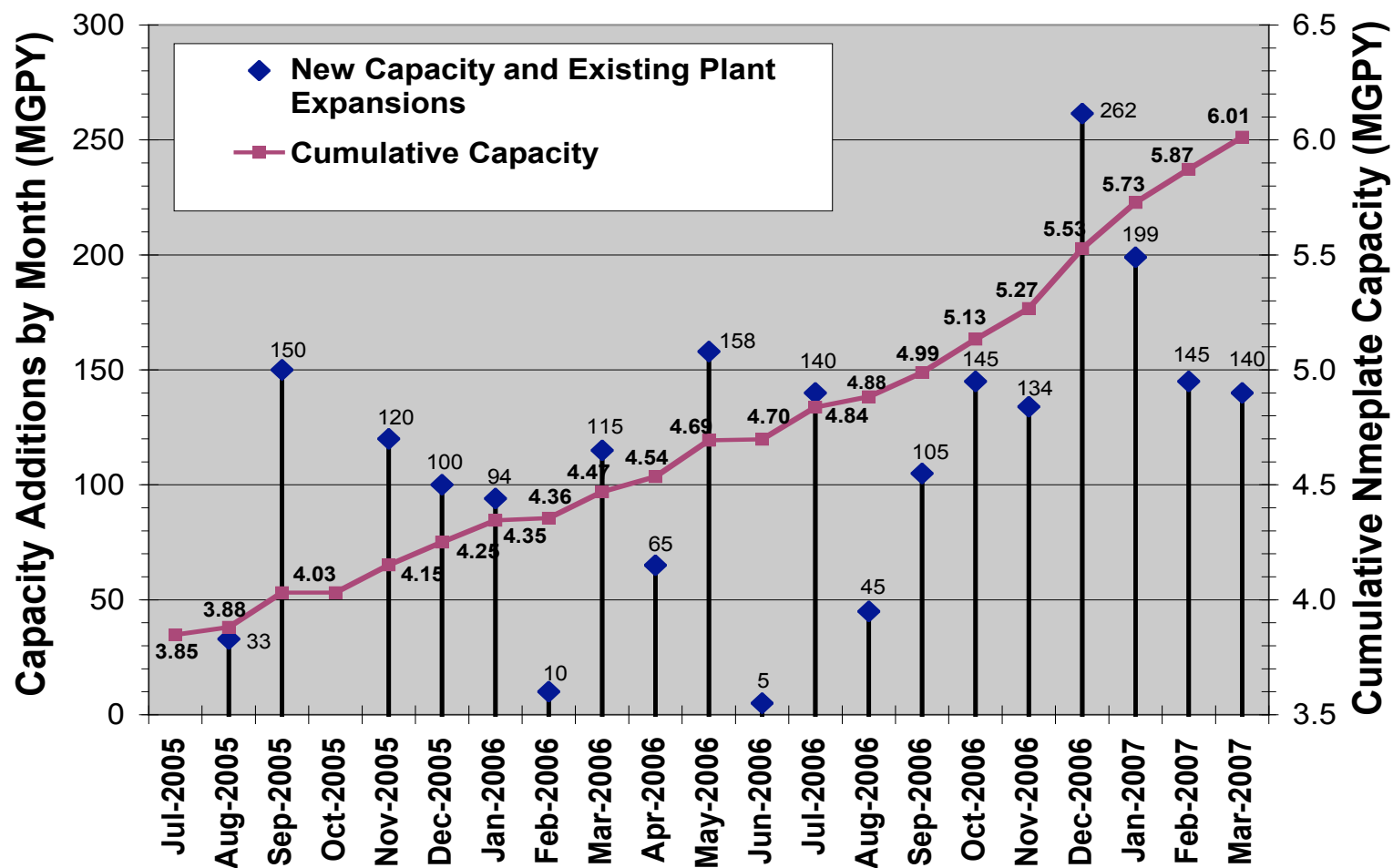


## Incremental Ethanol Supply Potential Sources

- Ethanol is used in multiple markets
  - Reformulated gasoline
  - Discretionary (gasohol or E85 markets)
  - Mandated state programs – Minnesota
  - Wintertime oxygenated gasoline requirements
- Incremental demand for ethanol in California could be met with a combination of increased in-state production and additional imports from domestic and foreign sources
- Meeting California's incremental ethanol demand under reasonable growth projections should not pose any significant supply concerns as long as domestic capacity continues to build



## U.S. Ethanol Plant Nameplate Capacity Growth July 2005 - March 2007



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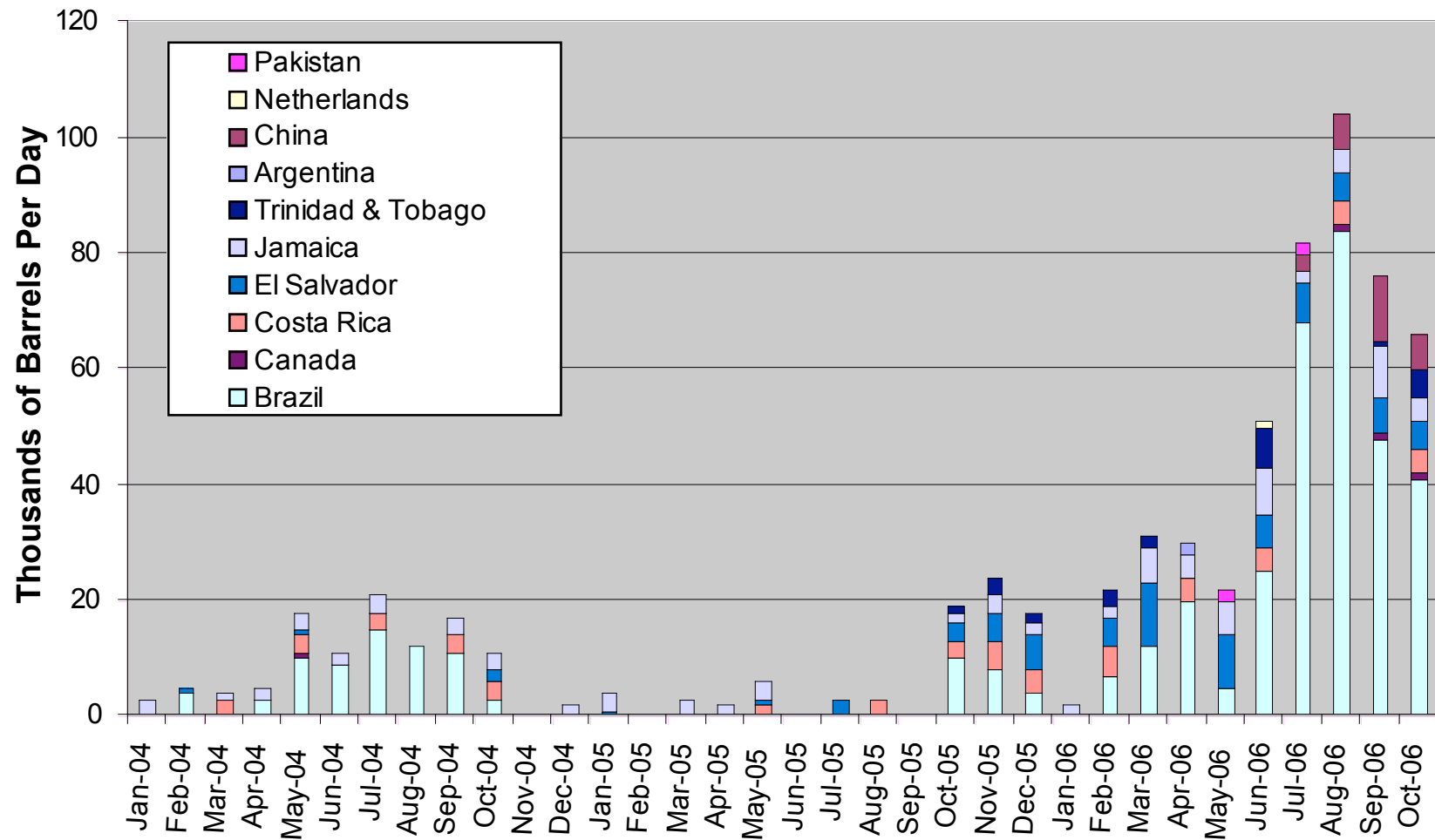


## Incremental Supply – New Production

- Domestic ethanol production capacity continues to increase
  - Additional 1.1 billion gallons of capacity over the last year
- Throughout the remainder of 2007 and into 2009, the completion of new ethanol plants could provide an additional 6 billion gallons of capacity if all facilities and expansions under construction are completed
  - 75 projects under construction according to the Renewable Fuels Association
  - Even if half of the capacity expansion is deferred or significantly delayed, industry should easily meet the RFS target of 7.5 billion gallons by 2012



## U.S. Net Imports of Fuel Ethanol







## Incremental Supply – Additional Imports

- Net imports of ethanol into the United States were at record levels during 2006
- Brazil was the dominant supplier of foreign-sourced ethanol, peaking at a level of 84 thousand barrels per day during August of 2006
- It is unlikely that Brazil can sustain these levels of shipments to the United States and still maintain adequate supplies for their drivers
- Although a vital source of augmented ethanol supply during 2006, additional domestic ethanol expansion and completion of the national MTBE phaseout should not necessitate another year of record ethanol imports



## Viability of CA Ethanol Production

- Ethanol production in the state is modest but has significant potential for expansion
- Traditional corn-to-ethanol facilities are the likely strategy to increase local production
- But sugar cane as a feedstock in the southern part of the state (Imperial Valley) has attracted a great deal of interest
  - High yields per acre
  - Favorable water costs
- Lack of a commercial size sugar cane-to-ethanol production facility is possibly hindering investment in this type of technology



## California Ethanol Logistics

- Ethanol is not normally transported through petroleum product pipelines
- Ethanol is therefore blended into gasoline when a tanker truck receives a load of fuel
- Most gasoline distribution terminals have a dedicated ethanol storage tank and receive ethanol delivery via tanker truck



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## California Ethanol Logistics

- Certain regions, such as Southern California, receive ethanol at a resupply “hub” via unit Midwest trains
- Ethanol is then trucked from the “hub” to nearby gasoline distribution terminals



- Intermittent ethanol delivery problems have occurred in seasonal markets that receive manifest rail cars



## Potential Logistical Issues Expanded Ethanol Use

- Gasoline is dispensed from nearly 60 distribution terminals located throughout the state
- The majority of these terminals receive ethanol via tanker trucks
- Expanding ethanol blending from 6 to 10% could place a temporary strain on this distribution infrastructure
- In some cases more rapid cycling of ethanol storage tanks can accommodate higher ethanol blends
- But the construction of new ethanol storage tanks may be required at a number of terminals



## Security of Supply - Ethanol

- To date, ethanol supplies have been adequate to meet California's demand since January of 2003
- The transition away from MTBE was successfully accomplished due to an adequate phase-out schedule
  - Refiners made the necessary modifications to their facilities and the distribution infrastructure
  - Ethanol industry increased capacity in advance of the deadline
  - Railroad operators worked with refiners to expand rail car and import terminal capabilities
- Seasonal ethanol supply contracts provided increased assurances that adequate ethanol volumes would be available throughout the year





## Security of Supply - Ethanol

- The concentration of ethanol in gasoline is usually no more than 10% by volume
  - Excluding sales of E85
- But no gasoline can be delivered if ethanol supply is temporarily unavailable at a distribution terminal
- Ethanol has become the “missing link” for finished gasoline – ethanol availability is now a necessary and vital ingredient to blend reformulated gasoline at the distribution terminals



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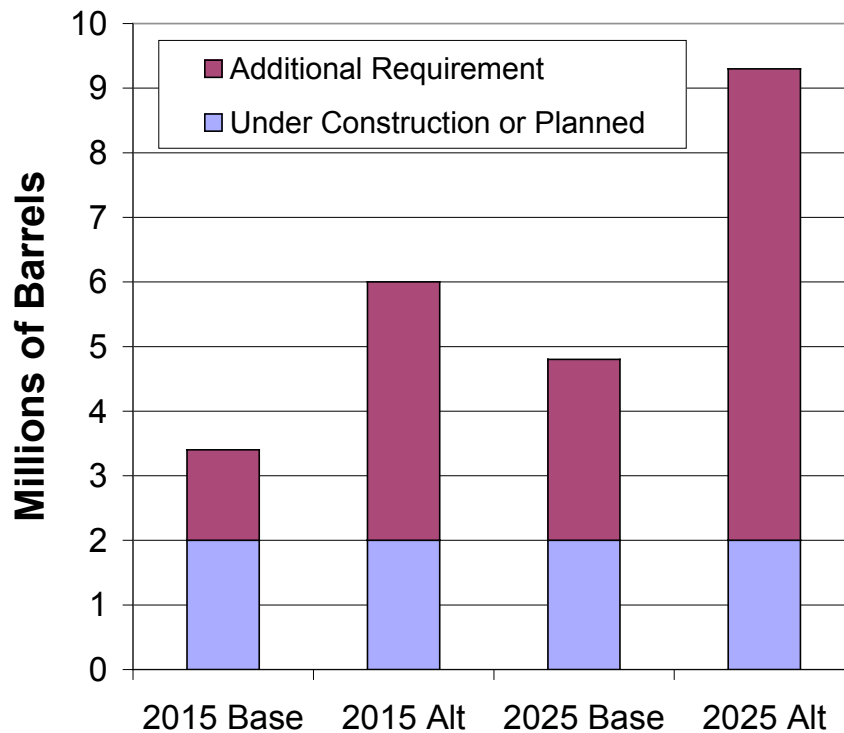
## Security of Supply - Ethanol

- Ethanol re-supply hubs could be vulnerable to interdiction of rail service – impact would be regional and involve several gasoline distribution terminals
- Interdiction of ethanol supplies could jeopardize adequacy of gasoline supplies
- Increased efficiency of unit train logistics and elevated ethanol inventory levels have decreased the risks to supply
- But the production and distribution system for gasoline in California is now more complex and therefore has an increased vulnerability to disruption of supply





## Additional Imports – Los Angeles Basin



- Assuming existing petroleum infrastructure capacity is retained, an additional 2.8 to 7.3 million barrels of new storage capacity will be needed in the Los Angeles Basin to handle projected clean fuels imports
- Any efforts to reduce or eliminate petroleum import infrastructure capacity could put at risk the ability of the transportation fuels industry to meet the state's demand



## Security of Supply - Gasoline

- California's dependence on imported gasoline and blending components is forecast to continue growing over the next 20 years
- Over the last several years, California demand for transportation fuels has been increasing at a faster rate than refinery production capacity expansion
- The capability to import adequate types and volumes of clean fuel components will increase in importance over the next couple of decades
- Adequacy of marine petroleum import infrastructure for California should therefore be viewed as a security of supply issue for the state



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